CLAIMS

1. A ferroelectric ceramic compound having the composition of the following formula 1:

$$s[L]\text{-}x[P]y[M]z[N]p[T] \quad \cdots\cdots (1)$$

where, [P] is lead oxide (PbO, PbO_2, Pb_3O_4),

[M] is magnesium oxide (MgO),

[N] is niobium oxide (Nb_2O_5),

[T] is titanium dioxide (TiO_2),

[L] is a metal selected from the group consisting of lithium tantalate ($LiTaO_3$), lithium niobate ($LiNbO_3$), lithium (Li) or lithium carbonate (Li_2CO_3), platinum (Pt), gold (Au), silver (Ag), palladium (Pd), rhodium (Rh), indium (In), nickel (Ni), cobalt (Co), iron (Fe), strontium (Sr), scandium (Sc), ruthenium (Ru), copper (Cu), yttrium (Y) and ytterbium (Yb), or oxides thereof, and

x is defined as $0.55 < x < 0.60$,

y is defined as $0.09 < y < 0.20$,

z is defined as $0.09 < z < 0.20$,

p is defined as $0.01 < p < 0.27$, and

s is defined as $0.01 < s < 0.1$.

2. A ferroelectric single crystal prepared from the ferroelectric ceramic compound according to claim 1.

3. The ferroelectric single crystal as claimed in claim 1, wherein the diameter of the single crystal is in a range of 5 cm to 30 cm.

4. The ferroelectric single crystal as claimed in claim 2 or 3, wherein a dielectric constant of the single crystal at room temperature is in a range of 6,000 to 15,000.

5. A process of preparing the ferroelectric ceramic compound according to claim 1,

comprising:

a first step of mixing 0:09 to 0.20 mol, 0.09 to 0.20 mol and 0.01 to 0.27 mol of magnesium oxide (MgO) or zinc oxide (ZnO), niobium oxide (Nb_2O_5), and titanium dioxide (TiO_2), respectively, with one another;

a second step of adding additives to facilitate a reaction of the mixture obtained in the first step or control the properties of the mixture and causing the resultant mixture to react at a high temperature; and

a third step of mixing the compound obtained in the second step with one selected from lead oxides having a formula of Pb_xO_y in an amount of 0.55 to 0.65 mol, drying and calcining the resultant mixture, and pulverizing the calcined product into powder.

6. The process as claimed in claim 5, wherein the additives added in the second step comprise one or more metals selected from the group consisting of lithium tantalate ($LiTaO_3$), lithium niobate ($LiNbO_3$), lithium or lithium carbonate (Li_2CO_3), platinum (Pt), gold (Au), silver (Ag), palladium (Pd), rhodium (Rh), indium (In), nickel (Ni), cobalt (Co), iron (Fe), strontium (Sr), scandium (Sc), ruthenium (Ru), copper (Cu), yttrium (Y) and ytterbium (Yb), or oxides thereof.

7. The process as claimed in claim 5 or 6, wherein causing the resultant mixture to react at a high temperature in the second step is performed at a temperature of 1,100 to 2,000℃.

8. The process as claimed in claim 5 or 6, wherein the mixing in the third step is performed through pulverization and mixing in a dry state or using a dispersion medium of an organic solvent.

9. The process as claimed in claim 5 or 6, wherein the calcination in the third step is performed at a temperature of 800 to 1,000℃.

10. A process of preparing a single crystal, comprising:

a first step of mixing 0.09 to 0.20 mol, 0.09 to 0.20 mol and 0.01 to 0.27 mol of magnesium oxide (MgO) or zinc oxide (ZnO), niobium oxide (Nb_2O_5), and titanium dioxide (TiO_2), respectively, with one another;

a second step of adding additives to facilitate a reaction of the mixture obtained in the first step or control the properties of the mixture and causing the resultant mixture to react at a high temperature;

a third step of mixing the compound obtained in the second step with one selected from lead oxides having a formula of Pb_xO_y in an amount of 0.55 to 0.65 mol, drying and calcining the resultant mixture, and pulverizing the calcined product into powder; and

a fourth step of melting the powder obtained in the third step under high temperature and pressure and slowly cooling the melt to be crystallized.

11. The process as claimed in claim 10, wherein the additives added in the second step comprise one or more metals selected from the group consisting of lithium tantalate ($LiTaO_3$), lithium niobate ($LiNbO_3$), lithium or lithium carbonate (Li_2CO_3), platinum (Pt), gold (Au), silver (Ag), palladium (Pd), rhodium (Rh), indium (In), nickel (Ni), cobalt (Co), iron (Fe), strontium (Sr), scandium (Sc), ruthenium (Ru), copper (Cu), yttrium (Y) and ytterbium (Yb), or oxides thereof.

12. The process as claimed in claim 10 or 11, wherein causing the resultant mixture to react at a high temperature in the second step is performed at a temperature of 1,100 to 2,000℃.

13. The process as claimed in claim 10 or 11, wherein the mixing in the third step is performed through pulverization and mixing in a dry state or using a dispersion medium of an organic solvent.

14. The process as claimed in claim 10 or 11, wherein the calcination in the third

step is performed at a temperature of 800 to 1,000℃.

15. The process as claimed in claim 10, wherein the melting under high temperature and pressure in the fourth step is performed by charging the powder obtained in the third step into a crucible under high temperature and pressure, closing the crucible, and melting the powder.

16. The process as claimed in claim 10, wherein the fourth step is performed by charging the powder obtained in the third step into a crucible under high temperature and pressure, closing the crucible, melting the powder at a temperature of 1,200 to 1,500℃ and a pressure of 20 to 1,000 psi, maintaining the melt at the temperature for 360 to 500 hours, and slowly cooling the melt to room temperature.

17. The process as claimed in claim 15 or 16, wherein the crucible is a crucible made of platinum, a platinum-rhodium alloy, or iridium.

18. The process as claimed in claim 17, wherein the crucible has an inner diameter of 5 cm to 30 cm.